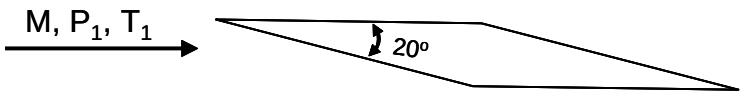
AS – 203 Gas Dynamics
Dr. T. M. Muruganandam
Assignment – 1,

Due: start of class on 10 Mar 2008. **Total score: 20.** **Weightage on final grade 5%**

1. Find the lift and drag force produced by air on a flat plate as a function of angle of attack. Lets take the area of the plate to be $1m^2$. The incoming Mach number is given by M = 2+0.5*{n mod 5} (where, n=last two digits of your roll number). The maximum angle of attack to be calculated for each case must be till the shock detaches from the plate. Assume the plate is infinitely thin. The incoming pressure and temperature are 1atm and 300K respectively. **[8]**

2. Lets take a 20^o included angle, symmetric double wedge as our airfoil. Use the same incoming conditions as in the previous case, and find the lift and drag of this body. You may stop the calculations at an angle of attack when any part of the flow tends to have detached shock. Use the length of each flat portion of this airfoil to be 0.5 m and the spanwise length to be 1 m. **[12]**



3. [Bonus] Explain the difference between the plots of the two lifting surfaces in problems 1&2. Is it advantageous to have thickness in supersonic flows? **[5]**